

**IN THE CLAIMS**

1. *(Currently Amended)* A method for using a chemical additive to increase the rise time of air bubbles emitted from a diffuser in water for the purpose of suppressing noise in a marine seismic survey, said method comprising one of the following:

(a) ~~the step of~~ coating the diffuser before use with a chemical additive having bubble coalescence retardation properties or wetting agent properties or both;

(b) mixing a chemical additive in with the air within the diffuser before the bubbles are emitted, said chemical additive having bubble coalescence retardation properties or wetting agent properties or both;

(c) injecting a chemical additive into the water in the region where the bubbles are emitted from the diffuser, said chemical additive having bubble coalescence retardation properties or wetting agent properties or both;

(d) mixing a chemical additive having wetting agent properties into the diffuser during fabrication;

(e) any combination thereof.

2. *(Currently Amended)* The method of claim 1, wherein the chemical additive used to coat the diffuser before use is Exxal-13 diluted in ethanol.

3. *(Currently Amended)* The method of claim 1, wherein the chemical additive used to coat the diffuser before use is one or more of ~~chosen from among~~ the following: 2-ethyl-1-hexanol, octanol, Exxal-8, Exxal-9, Exxal-13, and sodium dodecyl sulfate.

4. *(Currently Amended)* The method of claim 1, wherein the chemical additive used to coat the diffuser before use is a poly(oxyalkylene) block copolymer composed of ethylene oxide (EO) and propylene oxide (PO) blocks having any of the

following general structures:  $(EO)_x(PO)_y(EO)_x$  and  $(PO)_y(EO)_x(PO)_y$ , where  $x$  is in the approximate range 2-128 and  $y$  is in the approximate range 16-67.

5. *(Currently Amended)* The method of claim 4, wherein the chemical additive used to coat the diffuser before use is one or more of~~chosen from among the~~ following: Pluronic L81, Pluronic L62, Pluronic L64, and Pluronic 25R2.

6. *(Original)* The method of claim 1, wherein the diffuser is a perforated hose made from polymeric or elastomeric material.

7. *(Currently Amended)* The method of claim 1, further comprising the step of preconditioning the diffuser to be coated before use by soaking or bubbling it in fresh or salt water before coating it.

8. *(Currently Amended)* The method of claim 1, further comprising, after coating the diffuser before use with a chemical additive having bubble coalescence retardation properties, the steps of operating the diffuser in water followed by recoating the diffuser with a chemical additive having bubble coalescence retardation properties.

9. *(Cancelled)* ~~A method for increasing the rise time of air bubbles emitted from a diffuser in water for the purpose of suppressing noise in a marine seismic survey, said method comprising the step of mixing a chemical additive in with the air within the diffuser before the bubbles are emitted, said chemical additive having bubble coalescence retardation properties or wetting agent properties or both.~~

10. *(Currently Amended)* The method of claim 9~~1~~, wherein the chemical additive is atomized prior to mixing with the air within the diffuser before bubbles are emitted comprising the additional step of atomizing the chemical additive.

11. *(Currently Amended)* The method of claim 9~~1~~, wherein the chemical additive for mixing with the air within the diffuser before bubbles are emitted is one or more

~~of~~chosen from among the following: n-propanol, 2-ethyl-1-hexanol, octanol, Exxal-8, Exxal-9, Exxal-13, and sodium dodecyl sulfate.

12. *(Currently Amended)* The method of claim 9~~1~~, wherein the chemical additive for mixing with the air within the diffuser before bubbles are emitted is a poly(oxyalkylene) block copolymer composed of ethylene oxide (EO) and propylene oxide (PO) blocks having any of the following general structures:  $(EO)_x(PO)_y(EO)_x$  and  $(PO)_y(EO)_x(PO)_y$ , where  $x$  is in the approximate range 2-128 and  $y$  is in the approximate range 16-67.

13. *(Currently Amended)* The method of claim 12, wherein the chemical additive for mixing with the air within the diffuser before bubbles are emitted is ~~chosen from among one or more of~~ the following: Pluronic L81, Pluronic L62, Pluronic L64, and Pluronic 25R2.

14. *(Cancelled)* ~~A method for increasing the rise time of air bubbles emitted from a diffuser in water for the purpose of suppressing noise in a marine seismic survey, said method comprising the step of injecting a chemical additive into the water in the region where the bubbles are emitted from the diffuser, said chemical additive having bubble coalescence retardation properties.~~

15. *(Currently Amended)* The method of claim ~~14~~4, wherein the chemical additive for injecting into the water is one or more of~~chosen from among~~ the following: n-propanol, 2-ethyl-1-hexanol, octanol, Exxal-8, Exxal-9, Exxal-13, and sodium dodecyl sulfate.

16. *(Cancelled)* ~~A method for increasing the rise time of air bubbles emitted from a diffuser in water for the purpose of suppressing noise in a marine seismic survey, said method comprising the step of injecting a chemical additive into the water in the region where the bubbles are emitted from the diffuser, said chemical additive having wetting agent properties.~~

17. *(Currently Amended)* An apparatus for creating a bubble layer in water, comprising:

(a) a bubble diffuser ~~tube~~hose made from polymeric or elastomeric material and having small openings perforations at intervals along its length through which compressed air can be emitted, one end of said diffuser tube being closed, and the other end forking into a Y-conduit, said Y-conduit having a first Y-tube and a second Y-tube, said second Y-tube being adapted for connecting to an air compressor; and

(b) an inner tube having a closed end inserted closed end first through the end of the first Y-tube and on into the bubble diffuser ~~tube~~hose, said inner tube extending through an opening in an air-tight seal placed at the end of the first Y-tube and being adapted for connecting outside the first Y-tube to the output end of a pump.

18. *(Currently Amended)* The apparatus of claim ~~46~~17, further comprising a pump connected at its output end to the end of the inner tube extending beyond the first Y-tube and connected at its input end to a holding tank suitable for holding a chemical additive having bubble coalescence retardation properties.

19. *(Cancelled)* ~~A method for increasing the rise time of air bubbles emitted from a diffuser in water for the purpose of suppressing noise in a marine seismic survey, said method comprising mixing a chemical additive having wetting agent properties into the diffuser during fabrication.~~

20. *(Currently Amended)* The method of claim ~~14~~9, wherein ~~the diffuser is a perforated rubber and linear low density polyethylene (LLDPE) hose and the chemical additive for mixing into the diffuser during fabrication~~ is introduced in pellets comprised of Pluronic L81 blended into LLDPE, Polyvel VF-150 fatty glyceride wetting agent concentrate, or Polyvel VW-351 functionalized silicone wetting agent concentrate, and the diffuser is a perforated rubber and linear low density polyethylene (LLDPE) hose.

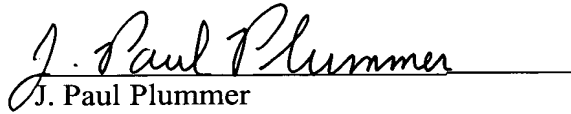
**Conclusion**

Applicants believe that amended claim 1 includes all embodiments of the present inventive method, and that the remainder of the claims are all written in proper dependent form referring to claim 1. Applicants further believe that all embodiments spring from the same inventive concept: using chemical additives to create and maintain small bubbles to form a bubble "curtain" of sufficient duration (i.e., slow rise time) to be useful in suppressing surface-related multiple reflections in marine seismic surveys. Therefore, Applicants believe the claim set is suitable for searching and examination. If the examiner wishes to discuss this application with counsel, please contact the undersigned. As Applicants have a total of twenty pending claims, no fees are believed to be required. If this calculation is in error, the Commissioner is authorized to charge the appropriate fees to the Deposit Account No. 05-1328.


Further, if the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

Date: Aug. 31, 2005

  
J. Paul Plummer  
Reg. No. 40,775

ExxonMobil Upstream Research Company  
P.O. Box 2189  
Houston, Texas 77252-2189  
Telephone: (713) 431-7360  
Facsimile: (713) 431-4664

<b>Certification under 37 CFR §§ 1.8(a) and 1.10</b>	
I hereby certify that, on the date shown below, this application/correspondence attached hereto is being:	
<b>MAILING</b>	
<input checked="checked" type="checkbox"/> deposited with the United States Postal Service in an envelope addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231. <div style="text-align: center;">37 C.F.R. § 1.8(a)</div>	<div style="text-align: center;">37 C.F.R. § 1.10</div> <input type="checkbox"/> as "Express Mail Post Office to Addressee"
<input checked="checked" type="checkbox"/> with sufficient postage as first class mail.	
<div style="border: 1px solid black; padding: 2px; text-align: center;">Monica Stansberry</div> <div style="border: 1px solid black; padding: 2px; text-align: center; font-size: small;">Typed or printed name of person mailing correspondence</div>	<div style="border: 1px solid black; height: 20px; margin-bottom: 2px;"></div> <div style="border: 1px solid black; padding: 2px; text-align: center; font-size: small;">Express Mail mailing number</div>
<div style="border: 1px solid black; padding: 2px;"></div> <div style="border: 1px solid black; padding: 2px; text-align: center; font-size: small;">Signature of person mailing correspondence</div>	<div style="border: 1px solid black; padding: 2px; text-align: center;">August 31, 2005</div> <div style="border: 1px solid black; padding: 2px; text-align: center; font-size: small;">Date of Deposit</div>
<b>TRANSMISSION</b>	
<input type="checkbox"/> transmitted by facsimile to the Patent and Trademark Office at facsimile number:	